

BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)

)
Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's)
Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to)
Reallocate the 29.5-30.0 GHz Frequency Band, to Establish)
Rules and Policies for Local Multipoint Distribution Service)
and for Fixed Satellite Services)

CC Docket No. 92-297

**CONSOLIDATED COMMENTS OF
LOCKHEED MARTIN CORPORATION**

Lockheed Martin Corporation ("Lockheed Martin") hereby submits its consolidated comments on the petitions for reconsideration and/or clarification of the Commission's *Third Report and Order* in the above-referenced proceeding filed by Hughes Communications Galaxy, Inc. ("Hughes"), Motorola Global Communications, Inc. ("Motorola"), and Teledesic Corporation ("Teledesic").^{1/} Lockheed Martin is the licensee of the Ka-band Astrolink™ System, and has submitted applications covering: (i) a modification to the Astrolink™ authorization; (ii) a follow-on Ka-band GSO FSS system (Astrolink-Phase II™); and (iii) a Ka-band NGSO FSS system (the LM-MEO System). Thus, Lockheed Martin has a direct interest in the Ka-band satellite service rules adopted in the *Third Report and Order*.

THE HUGHES PETITION

Hughes raises two issues in its petition which impact GSO FSS licensees. First, Hughes requests that the Commission amend Section 25.145(f) of its rules to clarify that GSO FSS

^{1/} See *Rulemaking to Amend Parts 1, 2, 21, and 25 of the Commission's Rules to Redesignate the 27.5-29.5 GHz Frequency Band, to Reallocate the 29.5-30.0 GHz Frequency Band, to Establish Rules and Policies for Local Multipoint Distribution Service and for Fixed Satellite Services*, CC Docket No. 92-927 (rel. Oct. 15, 1997) ("*Third Report and Order*").

licensees, like NGSO FSS licensees, are required to commence construction only after the unconditional grant of their satellite authorizations. Lockheed Martin supports this proposed clarification because, as the Commission has recognized, Ka-band licensees proposing to operate inter-satellite links ("ISLs") are unable to proceed beyond the initial stages of system development absent authorization to use specific ISL frequencies.^{2/} The proposed clarification will also avoid an unintended discrepancy between the treatment of GSO FSS and NGSO FSS licensees with respect to their implementation milestone schedules.^{3/}

Second, Hughes asks the Commission to specify the extent to which GSO FSS licensees will be required to modify their international operations to comply with pre-existing U.S. government coordination agreements. Lockheed Martin agrees that this information is important for GSO FSS licensees to finalize their system designs. Accordingly, Lockheed Martin supports Hughes's request that the Commission specify any modifications to the international operations of GSO FSS licensees required by pre-existing coordination agreements.

THE MOTOROLA PETITION

Motorola requests the Commission to amend Section 25.145(c)(1)-(2) of its rules to include a 5° minimum elevation angle criterion in the geographic coverage requirement for Ka-band NGSO FSS systems. Motorola argues that because the Commission adopted "the same

^{2/} In light of the recent allocation of additional ISL spectrum at WRC-97, Lockheed Martin urges the Commission to expedite the grant of authority to use specific ISL frequencies so that first-round licensees proposing ISLs may commence construction of their systems at the earliest possible time. The expeditious grant of these authorizations will enable the affected Ka-band licensees to progress towards implementation within the ITU-prescribed timeframe.

^{3/} For NGSO FSS licensees, the Commission's rule appropriately specifies that the system implementation milestones commence on the unconditional grant of their authorizations.

coverage requirements for 28 GHz systems that [it applies] to 'Big LEO' systems," the Commission must have intended to include the 5° minimum elevation angle criterion applicable to Big LEO systems.^{4/} Given the plain language of the Commission's geographic coverage requirement and the technical differences between Big LEO systems and Ka-band NGSO FSS systems, Lockheed Martin does not reach the same conclusion.

Like the Big LEO coverage requirement, the coverage requirement for Ka-band NGSO FSS systems defines the area in which a system must be capable of providing service:

(1) That the proposed system *be capable of providing fixed-satellite services* to all locations as far north as 70° latitude and as far south as 55° latitude for at least 75% of every 24-hour period; [and]

(2) That the proposed system *be capable of providing fixed-satellite services* on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands, U.S.^{5/}

^{4/} See 47 C.F.R. § 25.143(b)(ii)-(iii) (1997); *see also Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands*, 9 FCC Rcd 5936 (1994) at ¶¶21, 24.

^{5/} 47 C.F.R. § 25.145(c)(1), (2) (1997) (emphasis added). Except for the 5° elevation angle criterion, the Big LEO geographic coverage requirement is identical:

(ii) That the proposed system *be capable of providing mobile satellite services* to all locations as far north as 70° latitude and as far south as 55° latitude for at least 75% of every 24-hour period, i.e., that at least one satellite will be visible above the horizon at an elevation angle of at least 5° for at least 18 hours each day within the described geographic area; [and]

(iii) That the proposed system *be capable of providing mobile satellite services* on a continuous basis throughout the fifty states, Puerto Rico and the U.S. Virgin Islands, U.S., i.e., that at least one satellite will be visible above the horizon at an elevation angle of at least 5° for at least 18 hours each day within the described geographic area.

47 C.F.R. § 25.143(b)(ii), (iii) (1997) (emphasis added).

Thus, the Commission's geographic coverage requirement focuses on the capability of a proposed satellite system to provide service to the described geographic region.^{6/}

The record of the Big LEO rulemaking proceeding reveals that a standard 5° minimum elevation angle was included in the Big LEO coverage requirement as a result of uncertainty regarding the types of MSS services that could be provided by the newly-proposed Big LEO systems at low elevation angles. Rather than requiring each Big LEO applicant to identify a minimum elevation angle for each type of proposed MSS service, the Commission adopted a low 5° minimum elevation angle for purposes of the geographic coverage requirement, concluding that some level of MSS service could be provided above a 5° elevation angle given the Big LEO system designs and the propagation characteristics of the relevant frequencies. Lockheed Martin agrees with the position espoused by Motorola in the Big LEO rulemaking proceeding.^{7/} Including a minimum elevation angle criterion which is lower than the minimum angle at which a satellite system is designed to provide service would artificially expand the coverage of the system, and thereby undermine the purpose of the geographic coverage requirement.

^{6/} The emphasis on service area is entirely justified in view of the substantial public interest benefits derived from the provision of efficient and ubiquitous satellite communications services throughout the United States and around the world. *See Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Bands*, 9 FCC Rcd 1094 (1994) at ¶¶ 23-24.

^{7/} Throughout the Big LEO proceeding, Motorola argued *against* the adoption of a standard 5° minimum elevation angle and instead urged the adoption of a coverage requirement based on the minimum elevation angle at which a satellite system is designed to provide service. *See Comments of Motorola Satellite Communications, Inc.*, CC Docket 92-166 (filed May 5, 1994) at 17-21; *see also Reply Comments of Motorola Satellite Communications, Inc.*, CC Docket No. 92-166 (filed June 20, 1994) at 14-18.

Unlike Big LEO MSS systems, Ka-band NGSO FSS systems are designed to provide broadband communications services at specified minimum elevation angles. For example, the Teledesic System will operate at a 40° minimum elevation angle, the LM-MEO System will provide services at a 20° minimum elevation angle, and Motorola's Celestri Multimedia LEO System is designed to operate at a 16° minimum elevation angle. These minimum elevation angles, along with the other system parameters specified in the Ka-band NGSO FSS satellite applications pending before the Commission, are the result of a complex satellite system development process and represent each applicant's conclusions regarding optimal system design in view of numerous operational, satellite engineering, proposed services, system cost, and other factors. The Commission did not include a minimum elevation angle criterion in its geographic coverage requirement for Ka-band NGSO FSS systems because each system will meet the geographic coverage requirement based on its specified minimum elevation angle.^{8/}

In effect, Motorola requests the Commission to *assume* that Ka-band NGSO FSS systems will provide service at a 5° elevation angle for purposes of the geographic coverage requirement, despite the fact that none of the proposed systems have requested FCC authority to provide service at such a low minimum elevation angle. Given the plain language of the Commission's geographic coverage requirement and that Ka-band NGSO FSS applicants propose various system designs with distinct minimum elevation angles, Lockheed Martin believes that the Commission appropriately excluded a minimum elevation angle criterion from its geographic coverage requirement for Ka-band NGSO FSS systems.

^{8/} The minimum elevation angle incorporated into a proposed Ka-band NGSO FSS system design, as well as its orbit architecture and number of satellites, establish the geographic area to which the system is actually capable of providing service.

THE TELEDESIC PETITION

In its petition for clarification and/or reconsideration of the *Third Report and Order*, Teledesic requests the Commission to clarify: (i) that it has not endorsed any specific technique for NGSO systems to operate co-frequency; (ii) that it will not subdivide the 500 megahertz of Ka-band spectrum designated for NGSO FSS use; and (iii) that Teledesic will not be required to significantly alter its system to accommodate additional Ka-band NGSO FSS licensees.

Teledesic argues that the Commission's discussion of NGSO/NGSO sharing scenarios in the *Third Report and Order* may be interpreted as an endorsement of the use of different orbits by multiple NGSO FSS systems, and that the Commission should clarify that it has not endorsed any specific sharing technique for co-frequency operation by multiple NGSO FSS systems.

Lockheed Martin disagrees that this issue needs clarification. The *Third Report and Order* cannot fairly be read to endorse any particular sharing technique. Instead, the *Third Report and Order* merely outlines sharing scenarios between Ka-band NGSO FSS systems, and states that:

[the Commission] will evaluate all applications for NGSO FSS systems on a case-by-case basis, revisiting the multiple entry issue, as necessary, as we gain more experience with NGSO FSS systems.^{9/}

Accordingly, Lockheed Martin believes that no clarification of this issue is necessary.

It appears that Teledesic seeks to parlay this "endorsement" argument into an opportunity to reargue the issues of burden-sharing and orbit architectures of multiple NGSO FSS systems. However, the Commission has thoroughly considered these issues in the context of the 28 GHz rulemaking and Teledesic licensing proceedings, and its conclusions regarding these issues are the result of well-reasoned analysis. With respect to burden-sharing, the Commission has plainly

^{9/} *Third Report and Order* at ¶38; *see id.* ¶¶35-38.

stated that "*all* non-Government NGSO FSS systems [will] be responsible for some portion of the burden-sharing" to facilitate multiple entry of NGSO FSS systems.^{10/} As the Commission explained in the Teledesic authorization:

We seek here to foster a climate that maximizes competition and promotes multiple entry of NGSO FSS satellite providers to the benefit of U.S. consumers . . . [and] [i]n authorizing Teledesic at this time, we do not wish to preclude the use of this band by other NGSO FSS systems licensed to provide service either in the U.S. or in other parts of the world.^{11/}

Thus, Teledesic's Ka-band authorization clearly indicates that it will be required to bear a portion of the burden to permit entry by multiple NGSO FSS systems and, in addition, that the Commission is considering mandatory sharing principles and/or mitigation techniques to be used in coordination activities between NGSO FSS systems (including Teledesic).^{12/}

With respect to NGSO FSS orbit architectures, Lockheed Martin believes, like other leading satellite companies which filed second-round Ka-band NGSO FSS applications, that co-frequency operation by multiple NGSO FSS systems with different orbits is technically feasible. Of course, Lockheed Martin recognizes that ITU studies and other work regarding NGSO/NGSO sharing are ongoing, and that no definitive regulatory conclusions regarding co-frequency operation of multiple NGSO FSS systems can be made at this time.^{13/}

^{10/} See *id.* ¶38 (emphasis added).

^{11/} See Teledesic Corporation Application for Authority to Construct, Launch, and Operate a Low Earth Orbit Satellite System in the Domestic and International Fixed Satellite Service, File Nos. 22-DSS-P/LA-94, 43-SAT-AMEND-95, 127 SAT-AMEND-95 (rel. March 14, 1997) at ¶28 ("*Teledesic Authorization*").

^{12/} See *id.* ¶¶28-29.

^{13/} It is important to note, however, that the use of homogenous orbits to facilitate co-frequency operation of multiple Ka-band NGSO FSS systems may not be feasible given the continuing evolution of NGSO FSS system design. For example, Teledesic recently submitted a

Teledesic also requests the Commission to clarify that it will not subdivide the 500 megahertz of Ka-band spectrum designated for NGSO FSS use. In the *Third Report and Order*, the Commission raises the possibility of further division of NGSO FSS spectrum as a "feasible alternative" to co-frequency operation of multiple NGSO FSS systems if, and only if, NGSO FSS systems are unable to share spectrum.^{14/} Although Lockheed Martin believes that co-frequency operation of multiple NGSO FSS systems is technically feasible, Lockheed Martin also believes that it may be premature to exclude the possibility of subdividing Ka-band NGSO FSS spectrum in view of the ongoing work in this area. Therefore, Lockheed Martin cannot support Teledesic's requested clarification.

Finally, Teledesic asks the Commission to clarify that it will not require Teledesic to significantly alter its system to accommodate future NGSO FSS licensees. While Lockheed Martin generally agrees that satellite licensees should not be required to significantly alter their fundamental system designs to accommodate future entrants, Lockheed Martin recognizes that a number of factors must be considered in determining the extent to which licensees may reasonably be required to modify their systems or operational parameters to accommodate additional licensees.^{15/} Appropriate factors in this analysis may include public policy

modification application which proposes substantial changes to Teledesic's orbit architecture and system design. See Application of Teledesic Corporation for Modification of License to Construct, Launch and Operate a Non-Geostationary Fixed Satellite Service System, File No. 195-SAT-ML-97 (filed Sept. 26, 1997) ("*Teledesic Modification Application*").

^{14/} See *Third Report and Order* at ¶¶37-38.

^{15/} Like all FCC Ka-band satellite licenses, the Teledesic authorization is explicitly subject to compliance with the Ka-band service rules, changes in Commission rules and policies, and change by summary order on 30 days' notice. In addition, the Teledesic authorization is a temporary assignment of orbital planes and frequencies, and does not confer any permanent right to use the orbit or spectrum. See *Teledesic Authorization* at ¶¶36, 42.

considerations such as maximizing competition and efficient use of spectrum, as well as other factors including: (i) the stage of development of a given satellite service (*e.g.*, NGSO FSS); (ii) the status of a licensee's system design (evidenced, for example, by requests to significantly modify the authorization); (iii) whether a licensee's system is in the design stage, under construction, or operational; and (iv) the actual burden of implementing the modification.

In the case of NGSO FSS services, the Commission has placed great emphasis on promoting competition and preserving the possibility of future entry by multiple NGSO FSS licensees.^{16/} The Commission also waived application of its financial qualifications in the context of granting the Teledesic authorization based on a finding that "authorization of the Teledesic system does not preclude use of this band by other NGSO FSS systems."^{17/} Thus, the Commission has clearly indicated that multiple entry of Ka-band NGSO FSS systems is essential to promote important public interest objectives. Moreover, the Commission has emphasized the importance of competition and entry by multiple NGSO FSS systems without regard to the orbit architectures of proposed Ka-band NGSO FSS systems.

Lockheed Martin cannot speculate, in the abstract, whether any particular system or operational modifications necessary to permit entry by multiple Ka-band NGSO FSS systems would be reasonable. However, Lockheed Martin notes that NGSO FSS services are in a nascent stage of development, that NGSO FSS system designs are continuously evolving,^{18/} that the Commission has indicated that mandatory sharing principles and/or mitigation techniques

^{16/} See *id.* at ¶¶36-38.

^{17/} *Id.* ¶13.

^{18/} See, *e.g.*, *Teledesic Modification Application*.

may be implemented to facilitate co-frequency operation of multiple NGSO FSS systems, and that the burden of implementing certain system or operational modifications to accommodate multiple entrants may not be unreasonable given the current state of development of these systems. Thus, while Lockheed Martin believes that satellite licensees generally should not be required to significantly alter their fundamental system designs to accommodate future entrants, a number of important public interest and other factors support the possibility of requiring a NGSO FSS licensee to implement system or operational changes necessary to ensure multiple entry of Ka-band NGSO FSS systems.

CONCLUSION

For all of the foregoing reasons, Lockheed Martin urges the Commission to act on the petitions for reconsideration and/or clarification filed by Hughes, Motorola, and Teledesic in accordance with the comments provided herein.

Respectfully submitted,

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February 5, 1998

TECHNICAL CERTIFICATE

The undersigned hereby certifies, under penalty of perjury, that I am the technically qualified person responsible for the preparation of the technical material in the foregoing Consolidated Comments of Lockheed Martin Corporation, and that such material is complete and accurate to the best of my knowledge and belief.

A handwritten signature in black ink, reading "Richard Barnett", written over a horizontal line.

Richard J. Barnett
President
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Dated: February 5, 1998

CERTIFICATE OF SERVICE

I, Vicki Lynne Lyttle, a secretary at the law firm of Dow, Lohnes & Albertson, do hereby certify that on this 5th day of February, 1998, the foregoing "Consolidated Comments of Lockheed Martin Corporation" were served via first class mail (except where hand delivery is noted by an asterisk) to the following:

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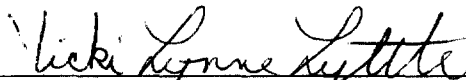
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